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Abstract

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A Numerical Model Study of Sea Ice in the Barents Sea

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13. Abstract *(Maximum 200 words)*.
Various digital filters, edge detectors, histogram modification, and three-dimensional display experiments are performed on mosaicked Geologic Long-Range Inclined Asdic (GLORIA) acoustic imagery. These experiments have the motivation of establishing Navy capability for viewing the seafloor,--especially in deep water and in three dimensions detecting objects on the seafloor, and enhancing existing monochrome GLORIA imagery. It was found that a Gaussian filter with a kernel size of 5 x 5 provided subjective enhancement to the lower intensity areas while some of the other filtering techniques, e.g., difference and gradient destroyed the dynamic range of the image. Kernel sizes were found to be extremely crucial in the experiments with this imagery, especially the median filter which did provide excellent smoothing of the imagery without sacrificing the edges. The digital mosaicking performed on this particular data set of acoustic imagery was determined to introduce multiple artificial artifacts. Image analysis showed the intensities (8 bit, 0-255) to follow the classic Gaussian distribution. Histogram equalization yielded exceptional results for adding contrast (which allows the determination of geological boundaries and detection of various seafloor objects. The vector intensity profile of the intensity offered an interesting future research objective, the correlation of acoustic imagery to bathymetry, the measurement of the depth of large bodies of water.

14. Subject Terms.
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ABSTRACTS V.1

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A thermodynamic sea ice model, including leads, has been coupled to a one-dimensional oceanic mixed layer model in order to investigate the upper ocean-sea ice interactions. The oceanic heat flux at the base of the ice layer (F_b) is predicted, not imposed, assuming a thermodynamic equilibrium between the bottom of the ice and the water just below. For the testing of the model, the annual cycle of the Artic sea ice and upper ocean is simulated along longitude 169.5°W. The model produces a realistic evolution of the sea ice thickness and extent and of the upper ocean salinity and temperature profiles. The major deficiencies in the simulation are linked to the absence of ocean and ice dynamics. The modeled value of F_b is far from being constant. Below thin ice, it can be larger than 5 W m^{-2} due to the important fraction of the solar irradiance that is transmitted through the ice, absorbed in the mixed layer and then returned to the ice. Below the thicker perennial sea ice, F_b takes values comprised between 0 and 2 W m^{-2} and exhibits a well marked annual cycle : it is maximum in March and April and vanishes during the summer months. It is also found that the changes of the sea water freezing temperature due to changes of salinity have an important effect on F_b and on the vertical density profile of the upper ocean.

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U16-P6 OP6

A NUMERICAL MODEL STUDY OF SEA ICE IN THE BARENTS SEA

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The dynamic/thermodynamic sea ice model designed by Hibler (Hibler, 1979, J. Phys. Oceanogr., 9: 815-846) is applied to the Barents Sea and the eastern half of the Kara Sea. Open boundaries exist between Spitzbergen and Norway, Spitzbergen and Franz Josef Land, Franz Josef Land and Novaya Zemlya and Novaya Zemlya and the Soviet coast. Monthly mean geostrophic ocean currents and oceanic heat fluxes from the Hibler-Bryan (1984, Science, 224: 489-491) ice ocean model are used as oceanic forcing. Atmospheric models were used to provide the surface stress and heat fluxes for the model. Model grid resolution is 25 km and a 6 hour timestep is used.

Tests are performed using two different boundary conditions. In the first case, the model uses boundary information from a coarser resolution Arctic basin model. In the second case, boundary conditions are applied which allow ice to exit from the basin if the drift indicates there is outflow or if drift indicates that there is inflow, a constant value of ice thickness is added at the inflow boundary.

A comparison is made between model results forced by a coarse resolution atmospheric model (400 km), the Naval Operational Global Atmospheric Prediction System (NOGAPS) model and by a Operational Regional Atmospheric Prediction System (NORAPS) model. Model results show good agreement between predicted ice edge advance and retreat when compared to the ice edge analysis from the Navy/NOAA Joint Ice Center and the Norwegian Meteorological Institute.